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BIM arabia

Introduction to Dynamo

BIM & Artificial Intelligence

3D Scanners

A Look at the Most Important Codes of the British BIM





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Introduction TO Dynamo



Dr. Samer El Sayary

Amira El-shazly

First lesson

Dynamo is a very important visualization tool that is used in architectural design programs. The most important feature in dynamo that is not available in most of the visualization tools, is it's ability to link between the visualization programming and the Building Information Modeling (BIM).

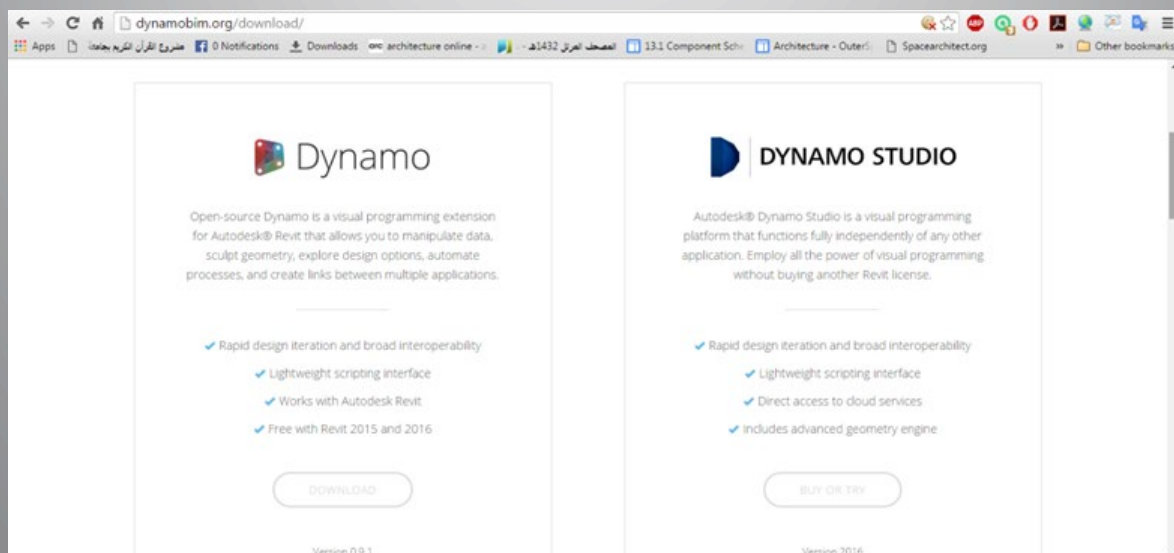
This is the first lesson in the Dynamo lessons series.

First: download the program:

Program download link:

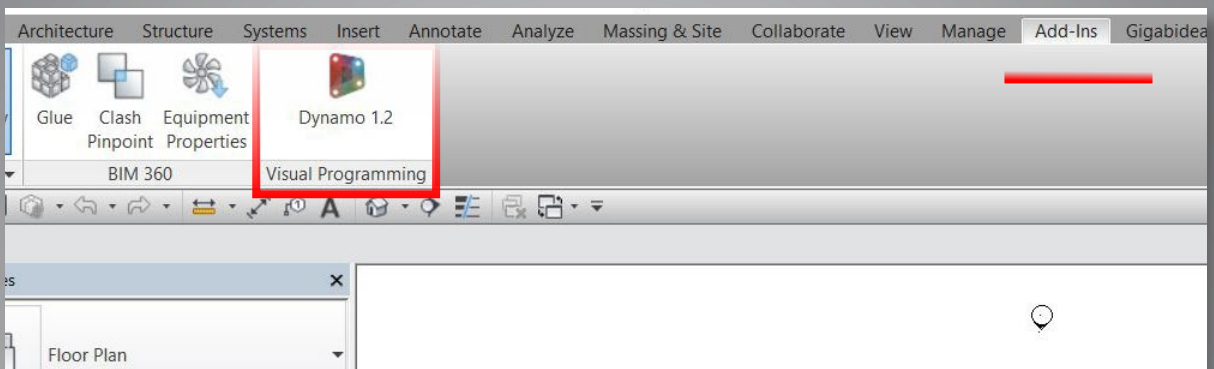
<http://dynamobim.org/download/>

There are two versions on the site, the first one is "Dynamo" which is free software but works only with Revit 2015 onwards. The second is "Dynamo Studio" which is a standalone paid version of the software that works independently.

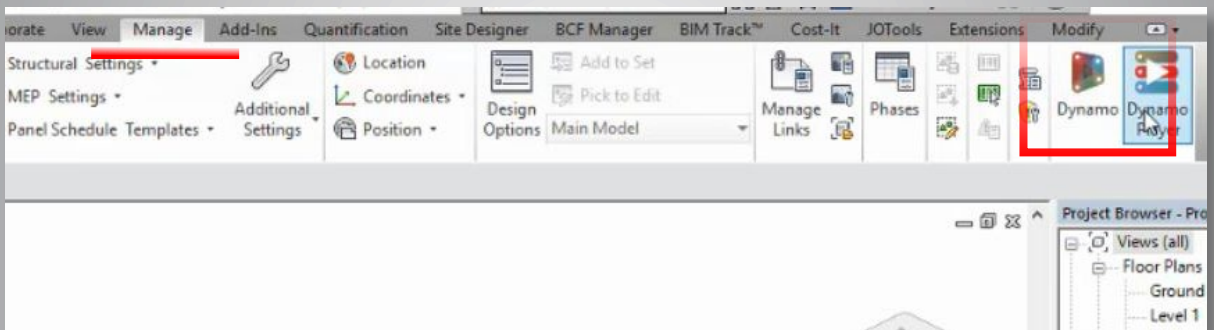


Second: Run the program

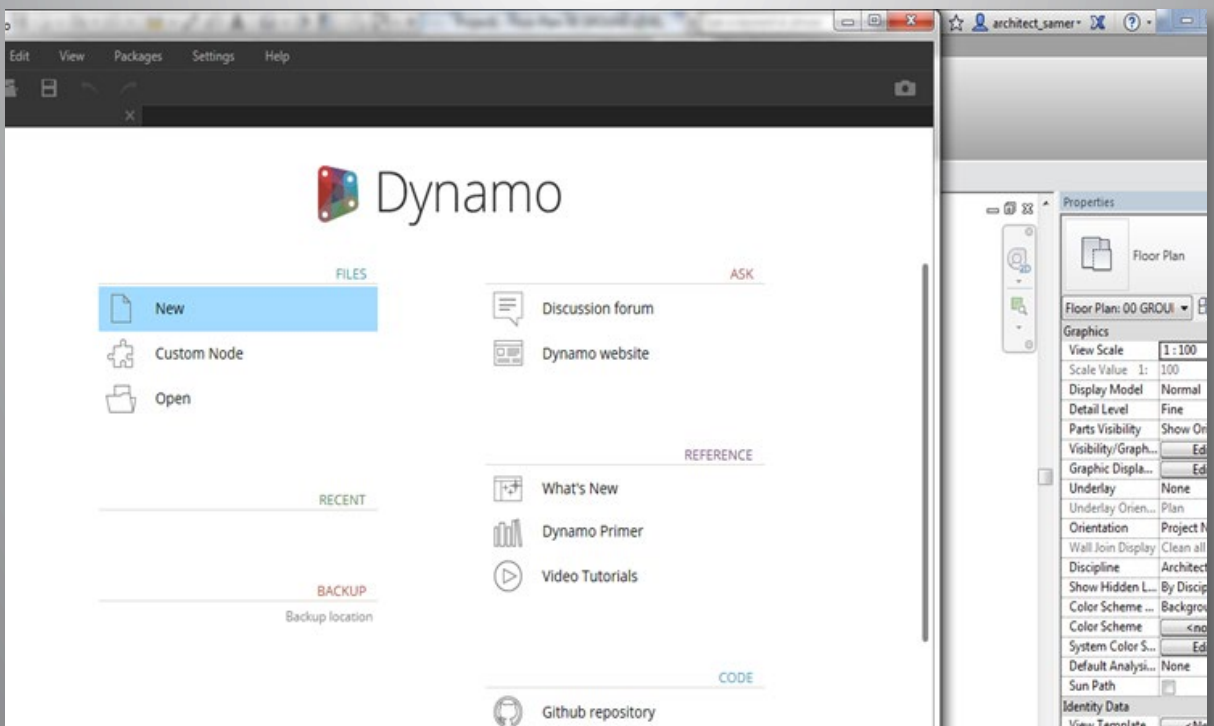
Open Revit / new template/ load Dynamo from the Add-ins ,

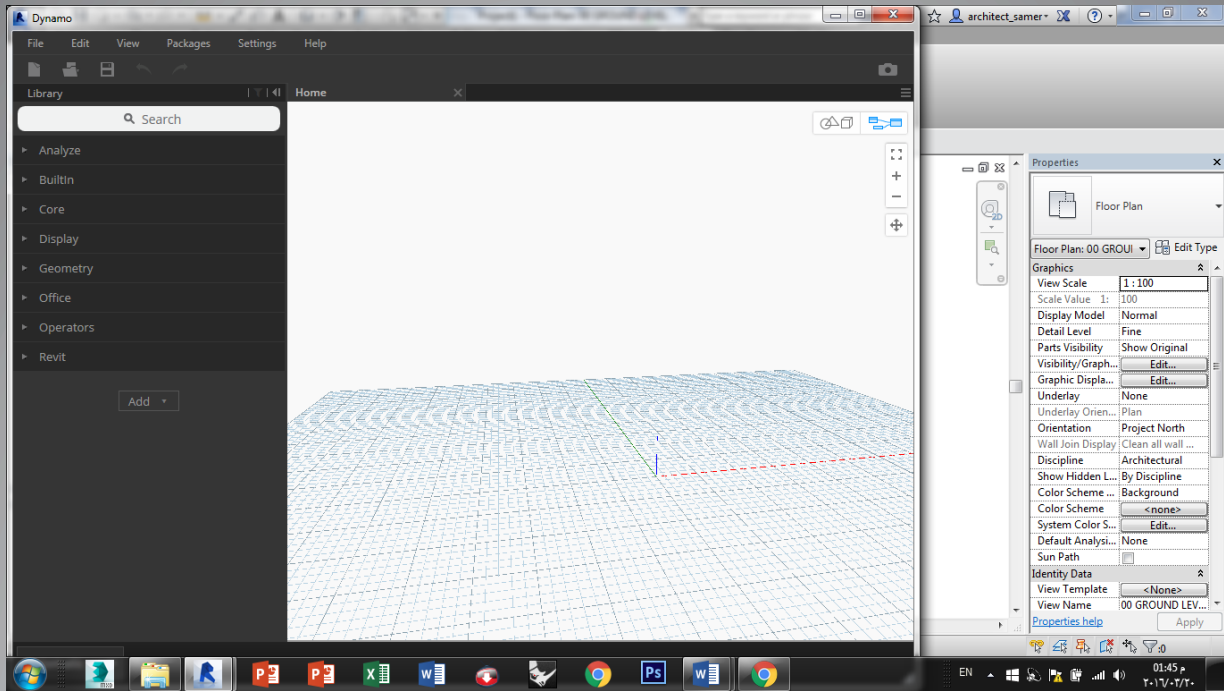


Or recently you can find it ,in Manage tab .



After opening the program, a new Dynamo window will open and a new file should be created.

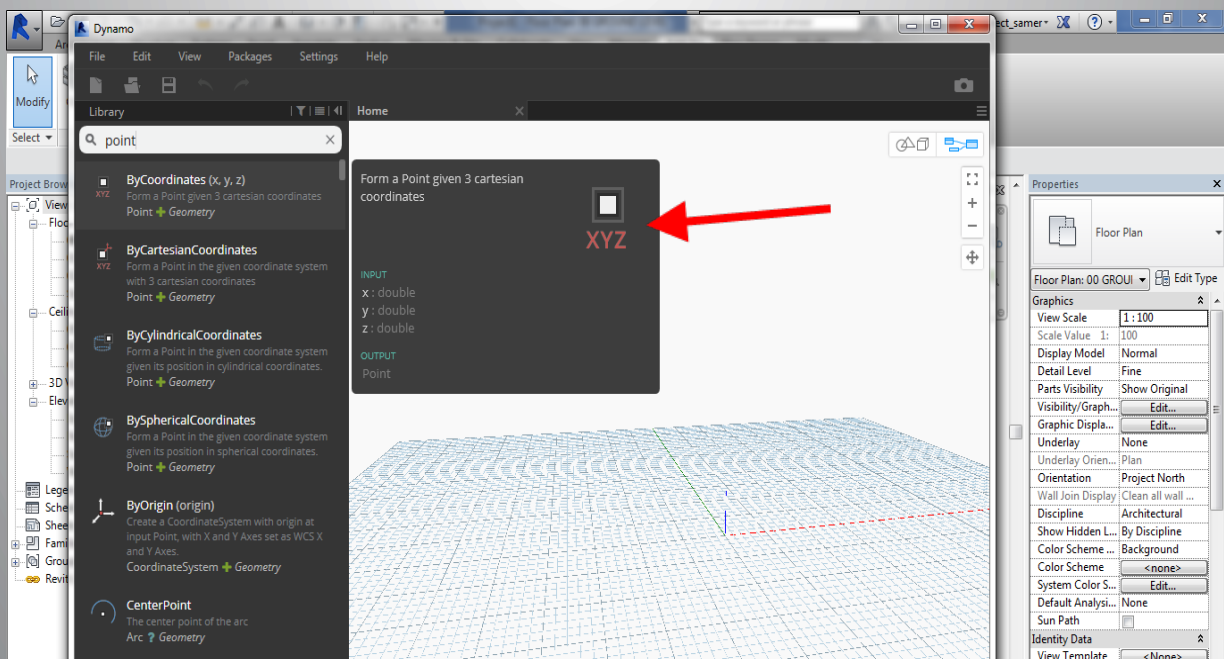


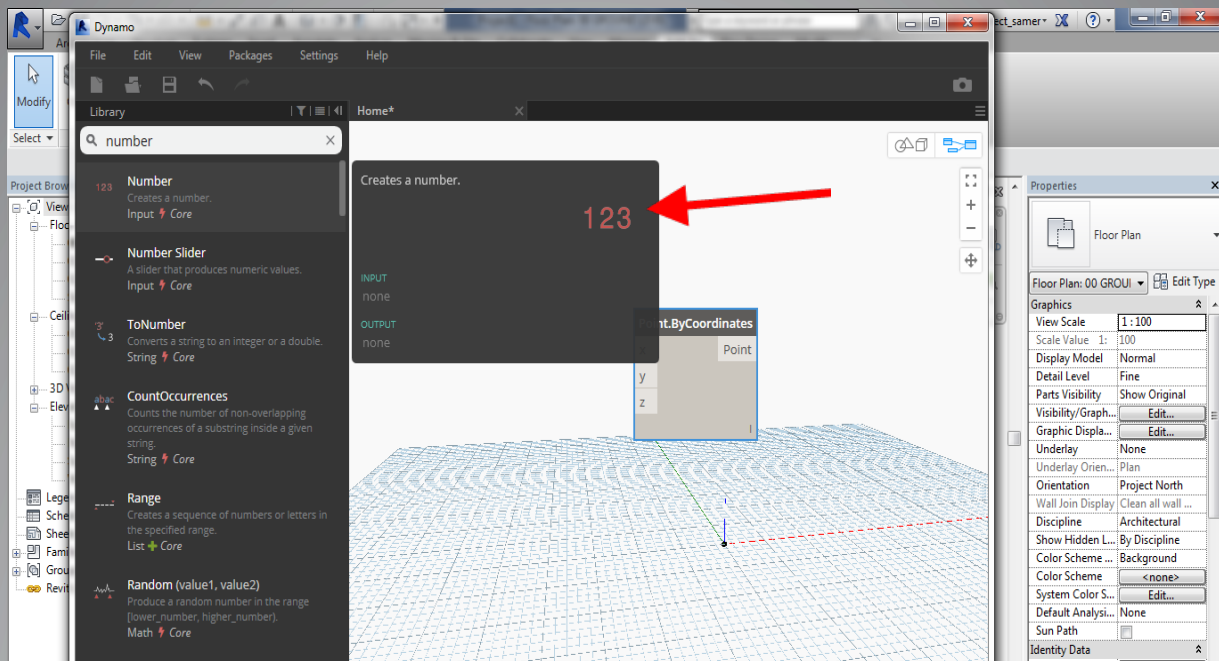


Third: Drawing inside Revit

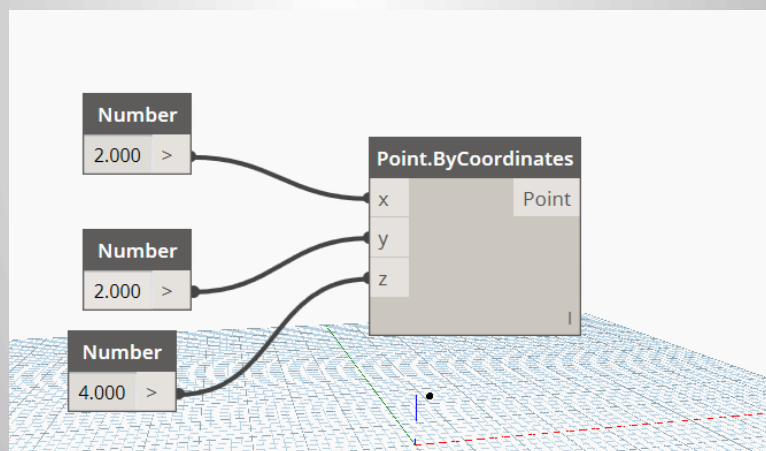
After successful installation of the Dynamo in Revit and opening a new file , we start the first step in using the tool:

1. Search in the search bar for a point ,and choose the point type “By Coordinates X,Y,Z. Now you have a point in the drawing but you should identify it’s coordinates.
2. Second we will add an element called “Number” to define the three point’s coordinates (X,Y,Z). Surely, we will need three points for each coordinate of the point’s coordinates.





3. After inserting the point and adding number to it, we can copy & paste by CTRL+C and CTRL+V respectively three times. The point should appear in the middle of the canvas and can be moved by the assigned numbers of the point.

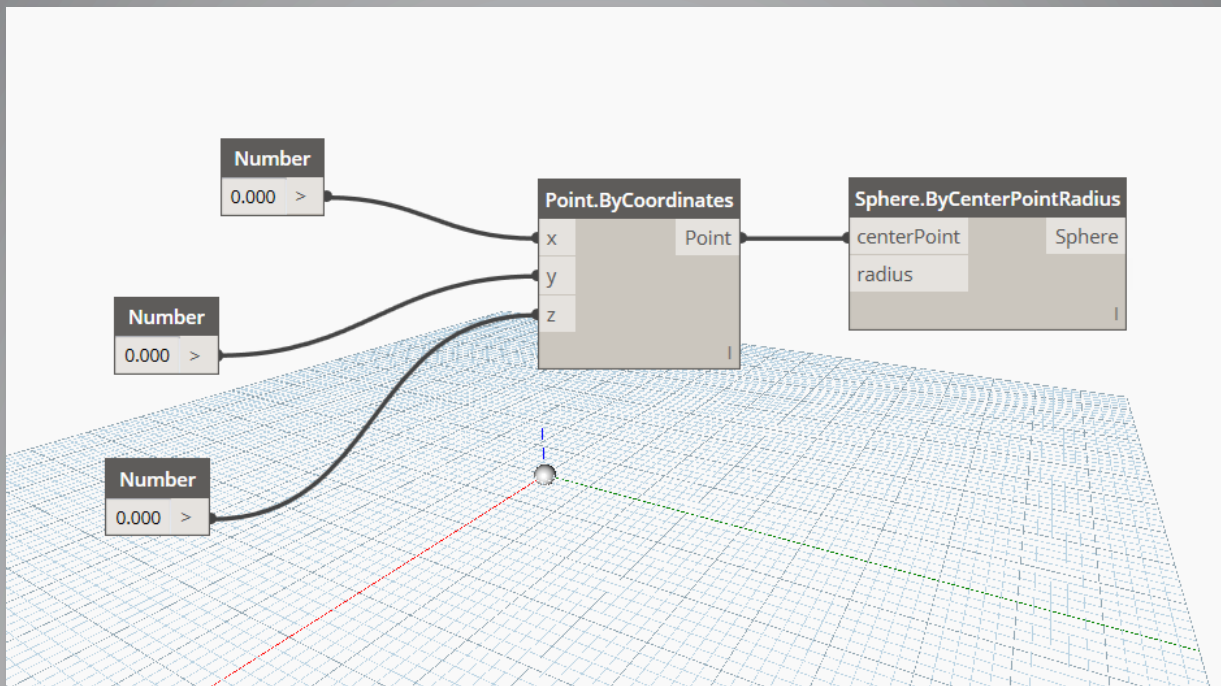


4. This point is the first step for many 3D applications and models. For example, it can be repeated or set to be the center of a 3D model.

5. The next step is to explore a model that the point can be used in.

6. Searching for “sphere” in the left menu, you will find a type named “By Center point radius”.

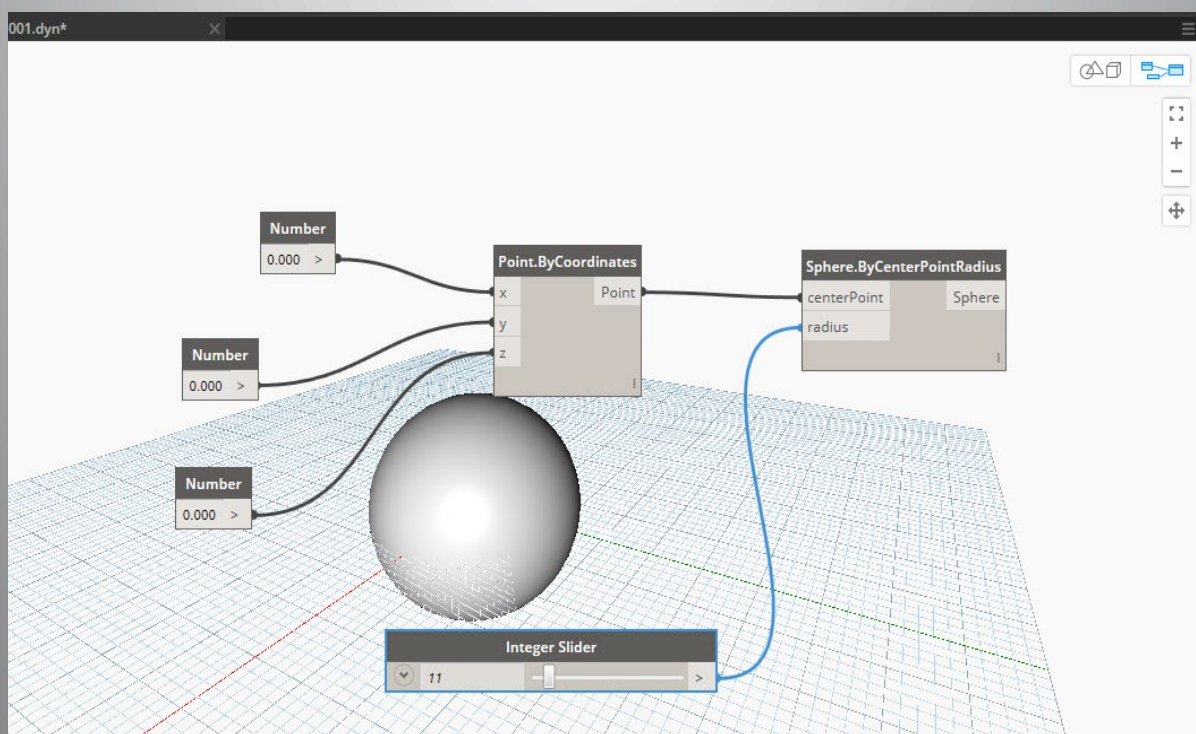
This type of models require a center point that can be connected to the point we made earlier.



7. We have to specify a radius that preferred to be variable and not a fixed number and we will do that using a “Slider” which is considered to be a digital counter.

8. Now searching for the “Slider” in the left menu we will find two types, we prefer to choose the type called “Integer Slider” to get a number without fraction.

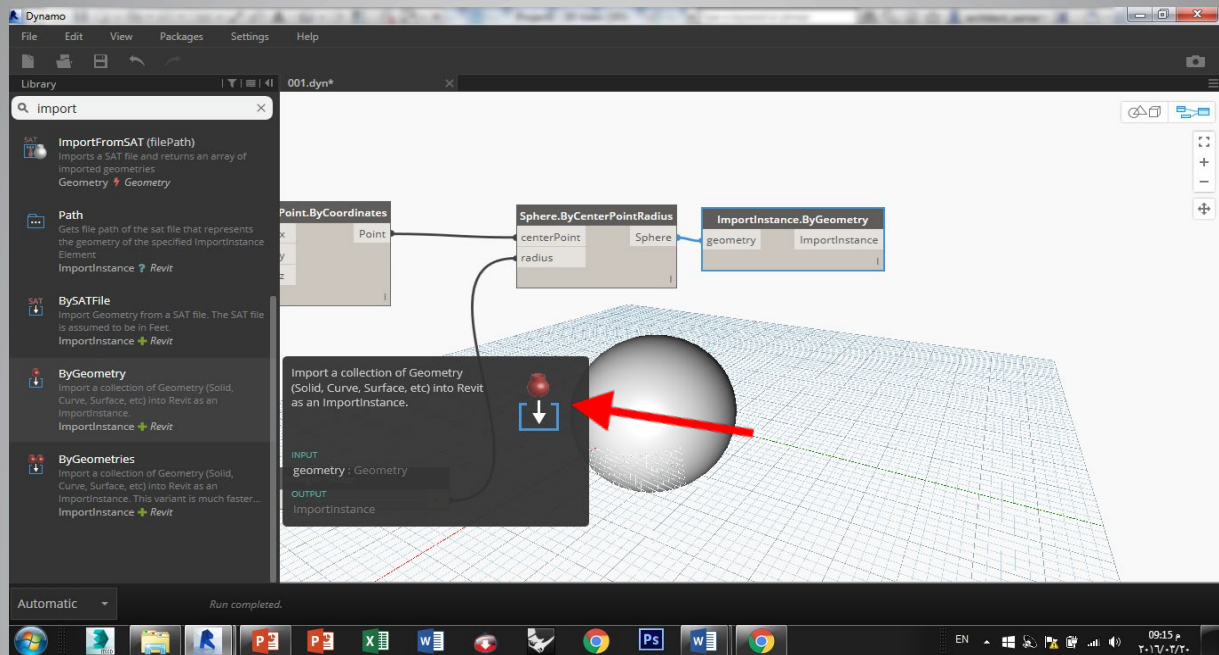
9. Now connect this slider with the radius.



10. By changing the slider, the radius will change and the sphere volume will change accordingly.

11. Now it is time to learn how to insert this model in to Revit.

12. It is simple, search for “Import Instance by Geometry” command which is responsible for importing geometries to Revit from Dynamo.



13. After this quick tour to introduce Dynamo, it is important to have the curiosity to discover the rest of commands and try to know it's different characteristics and features.

Good bye and meet you in the next lesson of the Dynamo lessons series.

Historical Buildings



Written By:
Ahmed Hamed Beck

Translated By:
Sonia Selim Ahmed

What is the appropriate definition of Building Information Modeling from the perspective of use in historic buildings?

The appropriate definition of Building Information Modeling of historic buildings: is digital presentation of physical and functional characteristics of historical buildings according to the contemporary situation of a historic building. Taking into account all stages of the building of additions, amendments, restoration and maintenance.

By simplified way, how can Building Information Modeling be applied to historic buildings?

Applying Building Information Modeling to historic buildings is done in three phases, the first phase is the phase of data collection from the site and Laser Scanning technology is used always, technical and architectural photogrammetric work to collect as much details accurately with high quality as possible. The second phase is the phase of processing this data. The third phase is the phase of building a model, depending on the information available from the laser scanner, architectural photogrammetry and any available information on the site such as architectural scheme, restoration and maintenance reports and other information.

What are the expected benefits from the use of Building Information Modeling in historic buildings?

The benefits of using Building Information Modeling in historic buildings are many, beginning with documenting the historical building a comprehensive documentation from all material and immaterial respects. In addition to understanding the historical building and its architectural elements and conducting analysis and studies to basics , infrastructure and any expected problems in the future, besides identification of damaged locations in the historic building and follow-up the historical building during its life cycle. Most important, to give a comprehensive picture to authorities for participation of this model with them, which helps taking the right decision toward these historic buildings. As well as the possibility to take advantage of historic Buildings Information Modeling to establish architectural library specialized of historic buildings that includes all the special details and architectural elements of such buildings, as well as it could be used in more recent projects, which helps to maintain the authenticity of these elements and its golden percentages.

Are there impediments to use building information modeling in historic buildings?

The barriers that prevent the use of Building Information Modeling in historic buildings can be divided into the following:

First: difficulties in historical sites, which lies in the complexity of several aspects: geography complexity of the site or engineering in the building shape of design, complications in obtaining permits from the authorities or owners who are responsible for the site, as well as to the seriousness of some historic sites and buildings, particularly those exposed to collapse.

Second: Technical difficulties lie in the absence of architectural library for such historical buildings and architectural elements, while the architectural library, of modern buildings are very rich in architectural details or blocks. For example, if you search in any Building Information Modeling programs for a certain door or window, you may find many shapes and designs and you might find the same product in the factory and all you have to do is that you add it in the model. On the opposite side a historic architectural element like Al-Roashin and Mashrabiya that are very difficult to find, yet must be rebuilt from scratch until it commensurate with the historic building. In addition to the absence of most of the architectural materials used in such buildings, for example the prospector stone.

Finally, the problems of material constraints lie in the high costs of the used technology like laser scanning technology in addition to the high cost of modeling of historic buildings and the lack of specialists in this field at the local and global levels.

What are the most important techniques to convert a building to 3D model? Is it possible to transform such huge buildings and temples of Luxor and sphinx?

For technologies that are used to convert the building to 3D model, they are many, but to date no technology is available to transform a historic building or existing building directly to a complete full model automatically, advanced technologies and techniques used in many of the historical sites in Europe like laser scanning technology, and architecture photogrammetry. After that they will be automatically modeled for predefined parts such as sewage, conditioning and electricity channels. While the most complicated parts are often modeled by modeling specialist.

For huge historic buildings such as the Luxor temple, the use of building modeling is not difficult, but the difficulty lies in knowing what is behind the walls, for example in many historic buildings the specialists study parts of the walls to know its physical characteristics and its construction method, and usually structural elements are not visible, which may lead to the use of the wrong method or construction element by the specialist. In this case, advanced methods must be used such as XRF, for building a correct model we must obtain the required studies and analysis properly.

What level of details is reachable while using Building Information Modeling in historic buildings? For example, is modeling limited to surface only or it includes quantities and characteristics of the used material?

The degree of details varies depending on the purpose of using Building Information Modeling of historic buildings. Here we must distinguish between the use of Building Information Modeling and the use of advanced scanning methods such as laser scanning. Yes the outputs of Laser scanning is the external crust of walls and elements we want to . For example, if we want to make a laser scanning on a historic building, in the output the external crust is inside and outside the building, in this case we can produce 3D stereoscopic , and interfaces, this information may be used in presentation, virtual reality and some analysis and studies, but it is difficult to use it in calculation of the material specifications and quantities. The role of Building Information Modeling of the historic buildings is to transform the output of laser scanning to a complete model with quantities and physical characteristics of the building material used and other of known uses for Building Information Modeling.

Do you add the fourth dimension (time but in historical rather than a scheme) of the model? Do you use the data to detect whether the building was built at one or several eras?

Adding the fourth dimension of the historic building is one of the most important outputs of Building Information Modeling of historic buildings. Depending on Building Information Modeling, the architectural or structural details often appear to prove the historical building periods and any increases or amendments on the building. For instance, the historic buildings in the city of Jeddah, we may find a three-stories building with facades, and interfaces show that the building was built at once, but when building an information model and conduct analytical studies, we find small details as a form of interlocking elements between the first and second floors compared with the third floor in addition to the difference in the aesthetic details of Al Roashin and Mashrabiya on comparison to the old and the oldest parts of them. What is the proof of accuracy of these data, reports, information and historical images available on the building?

How can the huge size of the Point Cloud files be reduced?

One of the most important challenges in the area of using laser scanning is the size and the amount of produced data, which may pose challenges and difficulties in processing and transferring it. To solve this problem there are several ways, the simplest one is the site preparation and make a good laser scanning plan to select the desired goal and choose the clear corner so that the least amount of common points work of laser scanning, taking into account the selection of accuracy

required for your laser scanner.

The advantage of using Building Information Modeling in A buildings is dispensing Point Cloud files after finishing of modeling, depending on Building Information Modeling in the analysis, studies, presenting and other.

What are the most prominent historic buildings in the world/Arab countries that have used Building Information Modeling for cadastral of its details?

Building Information Modeling technology has been used in many global projects but unfortunately few of them the purpose of historic buildings and sites. Many of these historic sites used BIM are in Italy, United Kingdom, Canada and Spain. The most famous historical project that used Building Information Modeling is Sagrada Família Cathedral of Anthony Gaudi architecture of which the work started in 1882 until now, Building Information Modeling technology has helped in building many complex elements of the building which were difficult to build in that time. (You can see the use of Building Information Modeling in the cathedral on the following link <https://youtu.be/2963MHzP-IE>)

Is there a curriculum/training courses, to use Building Information Modeling in historic buildings?

At the present time there are a lot of conferences, workshops and lectures concerned with Building Information Modeling in historic buildings, especially in Britain, Italy and in a lesser extent in Spain. Which has been always associated

with the global conferences in the field of heritage and restoration like CIPA conferences, Digital Heritage

What are the most outstanding global/Arab organizations that carried out using Building Information Modeling in historic buildings? What are the most prominent projects learned?

After the British government's support for the idea of using the Building Information Modeling in project with a contract value of at least five million pounds, the attention moves to possible benefits from the use of this technique in the buildings, current existing projects and historic buildings. Among organizations that support this field is English heritage. For the most prominent projects benefiting from Building Information Modeling technology of historic buildings, unfortunately few in number, including the Sagrada Familia Cathedral in Spain, as previously mentioned, the castle of Masqara in Italy, for Arab world I was honored to work a complete model of a historical Nasseef House building in Jeddah.

What are the most outstanding disciplines, which intersects with the use of Building Information Modeling in historic buildings? Has this been reflected on the identification of the material used in the construction of the old buildings?

The most outstanding disciplines that intersect with the use of Building Information Modeling in historic Buildings are many, including the architectural and civil engineering, material chemistry, sustainability, history and heritage, as well as geomatics and photogrammetry specialization. These disciplines contribute directly and indirectly to enrich the Building Information Modeling of historic buildings in many aspects, including the identification of the material used and the old construction methods, and methods of renovation and maintenance of these monumental buildings.



On the left-side is a 3D model of Nassif house produced by laser scanning where on the right side the Building Information Modeling of Nassif historic house in Jeddah, Kingdom of Saudi Arabia



Written by : Sahar Baker

Workshop at Salford University

BIM Level 2 uptake and emerging technologies for transportation and heritage sectors

The objective of the workshop is to bring industry workers, academics and technology suppliers together. In the event, we discussed the willingness to adhere to BIM Level 2, as well as discuss ways towards the transport and heritage sectors. The event was also attended by industry experts from the industry, heritage, academicians and researchers.



Here is some of what is stated in the workshop

1. **Derek Drysdale BSc CEng FICF (Chair Lean Construction Institute –UK)**: he focused on Lean deployed strategically supports use of BIM as shown the diagram below:



John Edwards Member of the BSI Committee: Presented a topic on the application of BIM to the Heritage sector by presenting case studies and explaining the UK Government's industrial strategy from an industry perspective:

1. 40£ Billion spent on centrally funded public buildings, every year- £ Millions wasted!
2. The information of construction is often: inaccurate, incomplete and ambiguous.
3. By 2025 the UK government aims to increase efficiencies in the construction industry through legislation and best practices in: lowering costs, speedy delivery, lowering pollutions and increasing exports.
4. BIM projects show: 20 % savings during construction and 33 % over the building life as a whole.

BIM – issues need consideration

1. Standard practices are being developed right now- who is leading- will suit existing building?
2. Where is the Heritage sector?
3. BIM 6D for FM- so much focus on buildings services- but what about fabric?
4. BIM experts claim that BIM can increase energy efficiency- but what about fabric data- theoretical or real?
5. Note that new buildings do not perform as they are designed to- often they are worse performers- will BIM help?
6. Older buildings do not perform as predicted through normal EPA methods. Will BIM help the reputation of older buildings?

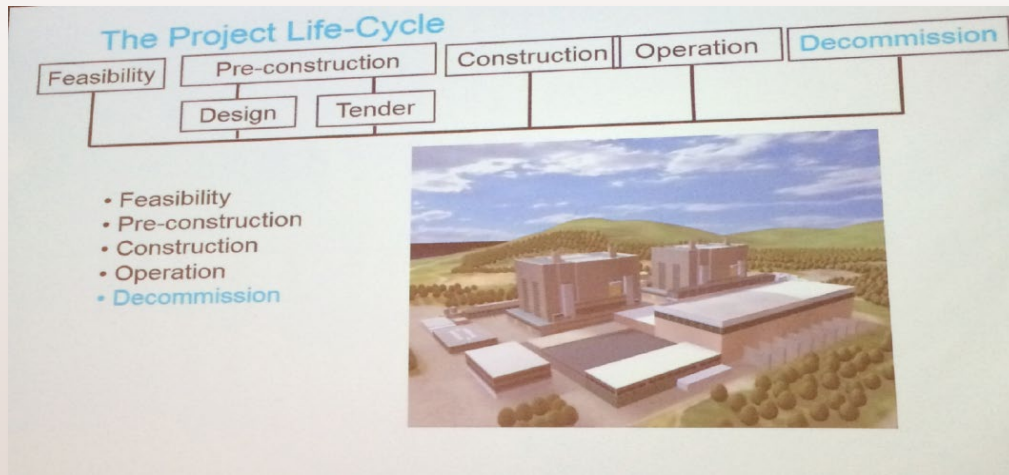


BIM for infrastructure projects

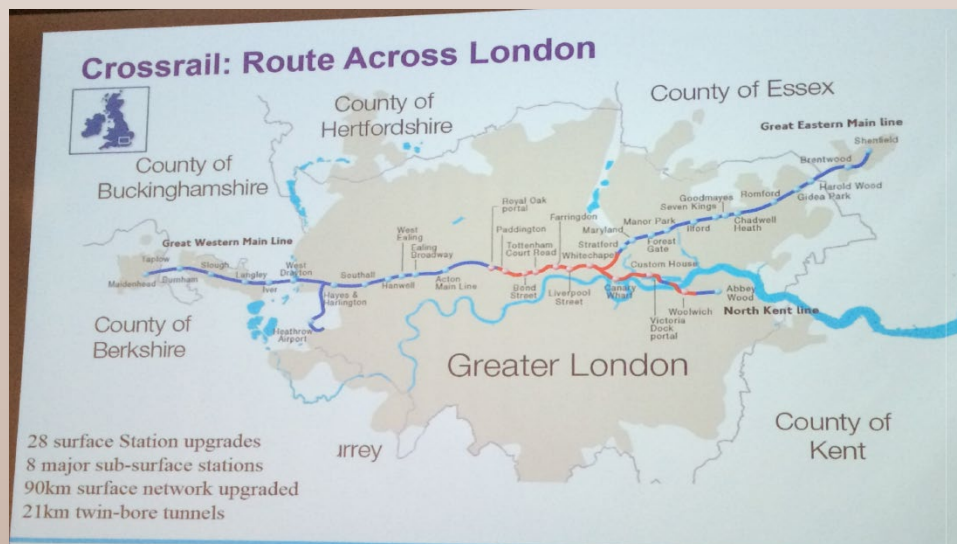
(Review of recent projects integrating BIM and life cycle data improving coordination using BIM)
Martin Simpson, associate director at Arup and Visiting professor, University of Salford.

Why BIM ?

1. Reduce capital cost
2. Reduce carbon emission
3. Decrease time to practical completion
4. Improved continuity of information / Audit trail.
5. Improve whole life asset management
6. Improve consistency in delivery (reduction of errors)
7. Improve level of performance and constructability
8. Improve safety
9. Reduce of waste
10. Reduce the consumption of resources.



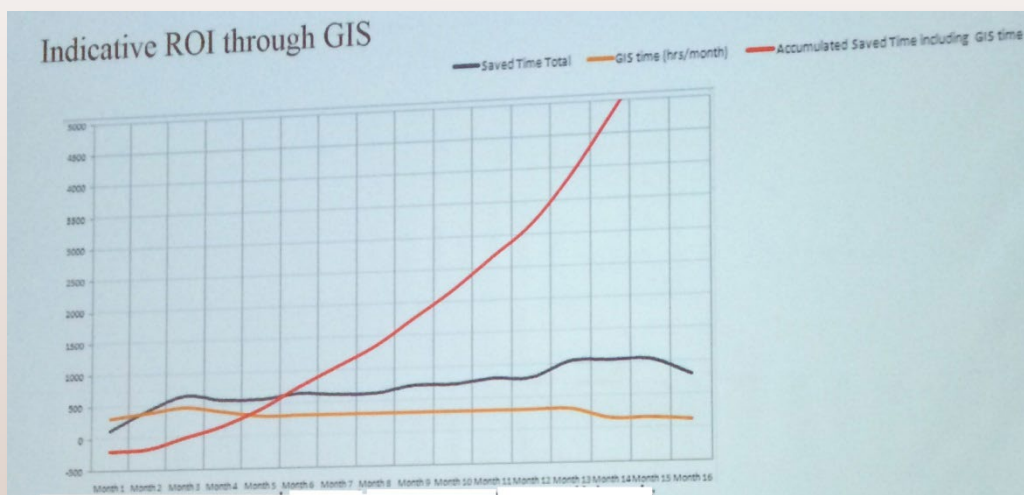
Crossrail was taken as a case study



The tools and systems used in the project are as follows:

- Spatial and non-spatial database (geotechnical database, land ownership, risk, data mapping, evaluation, etc.).
- 2D, 3D Cad for design and drawing production.
- Desktop GIS for analysis and information management.
- Web-GIS to share information and dissemination.
- Office applications for reporting on calculations and communications.
- Specialized programs, for settlement analysis.
- Document management system for document storage and management.
- Engineering Content Management System for drawing and storing the model.
- Management.

Also the ROI through GIS is illustrated below:



Time saving assessed through interviews across all stages.

Three main areas for the time saving potential identified according to the framework consultant:

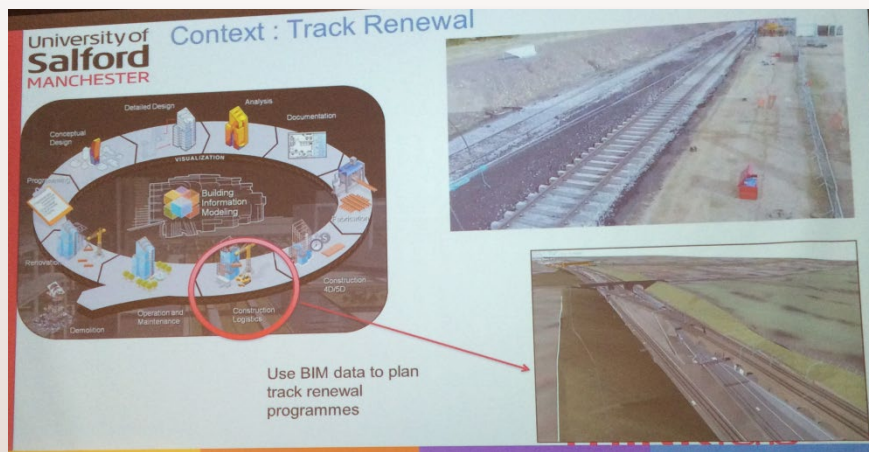
1. Finding reliable information.
2. Production and updating of CAD deliverables.
3. Production and updating of reports.

Direct benefit to the customer.

Some of the most important infrastructure challenges currently are:

1. **Clash avoidance** –(not clash detection) from concept, clash detection at detailed design.
2. **Data atrophy during projects lifecycle** due to :
 - Information exchange via 2D drawing/ sketches/ reports/ conversations...
 - Upfront simulation is limited and for some disciplines simulation is not accurate.
 - We start the final production phase commence before design is complete.
3. **Cooperate in BIM process /CBM**

Professor Terrence Fernando: Director of Think-Lab at the University of Salford, presented a 4D simulation environment for track renewal programmes



Challenges in creating a 4D schedule for track renewals:

1. Complex set of engineering activities which should be linked over time and space;
2. Difficult to build a common understanding of the schedule within the team and to other disciplines.
3. Inability to detect potential clashes, handling space requirements for handling plants, exclusion zones and access points before construction commence.
4. Inability to assess the impacts of last minute schedule changes on the whole operation creating problems during construction;
5. Difficulty to eliminate waste, reduce cost and delivering efficient programme.

In addition to the above, many presentations were made about historical buildings and how to preserve and maintain them through the use of BIM in the United Kingdom and in other areas such as Egypt, due to the large number of historical buildings. In the future, we hope to use BIM and GIS in projects in Arab countries.



BIM & the Measure of Success Conference

BIM the measure of success conference held by the Jordan Engineers Association- Department of International Relations and business development in cooperation with the Committee on young architects - where we ([Eng. Amer Hijazi](#) and [Eng. Hassan Omar](#)) as consultants in the preparatory committee for the Conference , a keynote speaker at the conference who discussed the theoretical and practical aspects of the building management systems (Building Information Modeling).



The importance of the conference, that will be discussed in the article through the presentation of the most important events, brings together the global, Arab and local experiences in a single crucible that enables everyone to discuss and learn about everything that is modern on the one hand, and enables officials and owners of companies in the engineering sector in stating that the construction management systems contribute to alleviating the problems faced by engineers during the construction process and reduce the cost , length of time and raise its quality.

For his part, the Assistant Secretary-General for International relations and business development [Eng. Mohammad Abu Afeafieh](#) said the conference is discussing 15 different scientific papers. He noted that the Conference aimed to develop the expertise of the Jordanian engineer, known for his good reputation in the field of engineering, both Arabic and local, as well as to strengthen the Jordanian engineer's ability to compete globally to become universal. Many major companies at the local and international levels are participating in the conference, which will offer models for international companies and construction to implement building management systems.

The conference was preceded by a preparatory meeting , which included the discussion of building modeling and the most important elements on which it was built, as well as the presentation of the most important projects and programming tools [Revit](#), [Civil 3D](#), [Infrworks](#) where this was reflected positively in the interaction of participants.

The conference brought together numerous personalities and global actors specializing in building modeling from the United States, Britain, Japan, Kuwait, Lebanon, Palestine, Egypt and Jordan especially with regard to infrastructure technology and modelling applications where the biggest challenges are for most individuals and companies looking for great business prospects mention them.

Dar Al-handasah, Building Smart, Leica, Bentley, Projacs, Hyder Consulting, Institution of Civil Engineers (ICE), Consolidated Contractors Company (CCC) and MACCAFERRI. A & H grope



The Conference also featured a wide range of lectures aimed at all specialized and non-specialized parties in the modeling world, as the biggest challenge was to spread the modeling culture of the engineering sector in Jordan and especially young engineers to raise awareness in order to increase their employment opportunities and to grant the Jordanian engineer more tools that make him on the path of global development in the field of modeling.

On the other hand, the conference presented a series of successful practical experiences of a number of local and global modelling companies through a presentation of these projects, with the most important benefits the advantages of modeling, as well as the most important challenges that companies may face, are to present a real perception to companies considering the transformation to Building Information Modelling.

In order to feature an interactive and more distinctive conference providing facts that can be used and worked on, a better feature has been provided by([Eng. Amer Hijazi](#) and [Eng. Hasan Omar](#)) in scientific research on the reality of modeling in Jordan through a large statistical survey on a nation-wide scale, those results were presented at the conference to inform all officials, scientists, and companies about the reality of modelling and what are the most important challenges facing individuals and fundamental points of change.

Finally, the conference contained more than 10 scientific lectures about modeling, and 5 other scientific lectures on modeling applications in all areas of construction and infrastructure through the preparatory meeting, and the conference was followed by lectures on modelling software from both Autodesk and Bentley to make the conference operational.



Written by :



Eng. Amer Hijazi

Infrastructure BIM Specialist

Autodesk Certified

PMP Certified

TOT Certified

Speaker at BIM Conference
-Amman

Lead Civil Engineers - Omrania

BIM Specialist - A&H group



Eng. Hasan Omar

Electrical BIM Trainer

TOT Certified

CO - Founder A&H group BIM
Services

Speaker at BIM Conference
-Amman

Manufacturing Engineer - KADDB



Translated by:
Mohammed ali etman

Since BIM is the article , then let's start with Revit.

The application that is similar to AutoCAD superficially which was originally an extension to AutoCAD but fundamentally is totally different in terms of work style and results. Revit works within a special work environment that can be described as a team, the team presence needs a leader who is the BIM manager playing an important role and distributing team tasks according to their specialization.

The cause of these procedures in the BIM method is the reality required by the work, which is the presence of an integrated team with strong leadership based on cooperation, coordination and continuous updating of information to avoid errors during and after work.



BIM & artificial intelligence

If we look at examples of artificial intelligence, we will find the smart car inspired the idea of smart roads and smart buildings inspiring you with the idea of a set of buildings connected electronically to form the intelligent district . Artificial intelligence affects all functions. Here we will need to return a little to the beginning of computers and artificial intelligence to identify important points. What is the beginning?

Whether it is related to technology, work method or any project, all the development is leading towards of artificial intelligence and the use of computer in carrying out the work because of speed, accuracy, economy and this is the starting point and as long as they are the goal, then there will be no limits to computer intervention in the work, which may cause a real threaten for some jobs, if you don't cope up with, then you most likely will face challenges in your future career. If we look at ourselves, we will find what we are applying randomly is planned effectively in America and Japan. So, either develop yourself and stay ... or lose everything.

BIM Manager role is equivalent to team supervisor in the traditional design ways, Revit architect modeler is equivalent to traditional architect, also Revit structural modeler is parallel to traditional structural engineer and so on. Of course, It is not equivalent to the same role but each has his own responsibility, the complexity and roles diverge make it complex to understand clearly.

Before BIM appears, the computer did not play a large role in the process of cooperation and coordination. The errors were many, but this technology today makes the integration of work more visible and reflects a great effort and more accurate work than before.

But, we cannot deny the role of artificial intelligence in creating a new environment for the architectural work of the computer , a large role in which its limits can never be predicted.

Hence, with the advent of artificial intelligence and as an engineer you can imagine in the future the existence of a machine that records the information and convert it into a program that would be applied or translated by computers into a plan. The question certainly is what will be your turn then?

Certainly, human beings will not perish and the machine will only work on its own, but certainly, it will decrease jobs and traditional work will not be popular. This scenario was not born today but it is on the rise.

In conclusion, the term artificial intelligence in itself, has created another term, a field of research. In the development of this term, the simulation of the machine is not limited to making a robot that performs a function or application on the computer, but it is recommended to find a simple communication language that connects man and machine with a digital world parallel to our world. I do not mean machine language zero and one , rather a language allows you to understand any new software easily.

Where do we stand for all of this?

Since the beginning of the industrial revolution in 1900s many writers and scientists have warned about the imminent threat of jobs and labor because of the rapid spread of the machine, but none of this has happened and the simple labor is still required till today because of the natural adaptation which always acquires human labor to gain new experiences to deal with the new technologies.



EzzAldeen Bin Ramadan



Mohamed Metwaly Ghattas



Written by: Mohammed Salam
Translated by: Mohamed Metwaly

3D Scanners

3D scanners are constantly evolving, so we met a specialist to know the latest news of this technology and how we can use it in BIM

Omar Selim: Please get yourself introduced to us.

Mohamed Salam: Engineer Mohamed Salam, Director, National Computer Services (NCS Qatar)

Omar Selim: What is a 3D laser scanner?

Mohammed Salam: 3D laser scanner is a tool that analyzes assets (or models) by collecting data on their outer shape. These data are used to create 3D digital models used in many applications, including but not limited to civil engineering, roads, analysis of car accidents, and so on ...

A device to convert the existing building into three-dimensional points, currently used strongly in BIM by converting the building into a three-dimensional model using a computer either on Revit, Navisworks, ArchiCAD or any other program and we in the company create models for buildings and train companies on this.

Omar Selim: What are the benefits of using the 3D scanner in BIM?

Mohammed Salam: Newly used in BIM where the 3D scanner used after completion of the construction to compare As-Built with BIM drawings using specialized software such as FARO Scene, Autodesk Recap or Scan to BIM. Data from the 3D scanner converted to Revit, Naviswork software for easy handling and understanding. Since the scanner analyzes what only can be seen by the eye, so it must be used before finish ceiling. For example, power and air connections need to be checked before installing the ceiling. Then above programs compare what is done to what was modeled, thus make it easier to connect BIM model and facilities management through programs such as IBM Maximo or Archbus, or through BIM for FM, such as the YouBIM program. So at the end of the project, it is easy to review the data and facilities accurately.

Omar Selim: Can it be used in large historical and archeological buildings such as Abu Simbel Temple?

Mohamed Salam: The latest 3D scanner FARO Focus X330 and FARO Freestyle, the first device scans a range of 150 meters right and 150 meters left with a total area of 300 meters. 360 degrees, ie, whatever it sees from the scanner center, it analyzes it if it is a temple or a statue, and so on. The model can also be printed using -3D printing. The other device Freestyle is used by hand to scan small objects.

Omar Selim: Does it have any use other than buildings?

Mohammed Salam: Yes, used in the analysis of accidents to find out the cause of the accident and the speed of collision, also used in the reconstruction of the archaeological sites as 3D survey makes reconstruction easier and finally used in crime scene analysis.

Omar Selim: What is the device size?

Mohamed Salam: The latest models FARO Focus X330 and FARO Focus X130 device size is 10 * 20 * 24 centimeter, weighing about 5 kg which is easy to carry from place to another, touch screen, Wi-Fi and remote control. the installation process is very easy and can be suspended down to reach difficult and deep places such as tanks where it is difficult for technicians to reach.

Omar Salim: What is the details accuracy level?

Mohammed Salam: The error ratio is 2 mm for each 50 square meter area, and the speed of the measurement is 976,000 points per second.

Omar Salim: Can the device know the points type? In the sense of differentiating the elements and knowing the difference between the wall and the doors

Mohamed Salam: The device collects data and then processes it using programs such as FARO Scene, Autodesk Recap or Scan to BIM then elements are identified and linked to the BIM, which is easy to understand and match.

The 3D laser scan is a modern technique that uses laser light to scan the body directly without contact, resulting in a three-dimensional cloud of the scanned body, by processing this dotted cloud a 3D model is produced.

There are three types of 3D laser scanner:

- Fix Terrestrial Laser Scanning,
- Kinematic Terrestrial Laser Scanning,
- Airborne Laser Scanning.

3D laser scanner has a wide application field such as archeology, civil engineering, and roads. Advantages of 3D laser scanning:

- (1) data accuracy
- (2) a large amount of data for the scanned area
- (3) speed in data capture,
- (4) obtain data from the body without contact, and this is an important function in the case of the difficulty of access to the body.



Steps to create a 3D model using Fix Terrestrial Laser Scanning:

First: Create a coordinate network around the building or object to be scanned using theodolite or total station, so that we get the triple coordinates of the concentration stations, which will then benefit us to calculate the target coordinates. Note that in the absence of known network coordinates, the 3D scanner can be installed on free stations. This method is used in the case of a statue or an archaeological column designed to create a 3D model.

Second: We choose the type of goals that are suitable for monitoring process, since each object has special objectives, for example, to monitor a building that may be limited to the goals called White Black Targets, and in the case of surveying a statue it is better to use Spherical Targets. Scan the previously placed targets on the walls of the building or distributed around, thus to calculate its coordinates based on the coordinates of the grid points we have scanned earlier.

Third: We scan the body using the 3D scanner with highly considering the precision of positioning and also accurately determine the target. the observer should also select points located around the scanned body so that the survey provides overlapping areas and covers the entire body, with the aim of achieving a complete model and increasing accuracy, avoiding the existence of areas not covered well during the survey which makes it difficult to model later. before scanning and preparing the device for the survey, we operate the laptop attached to the 3D scanner and connect the Internet cable to the laptop, and then from the Start menu, run the program. We add the scanner name (HDS6000) and the rest of the required settings according to the type of device used.

Then we create a new database and give it a name. after you open the folder and before you start the scan we determine the field of view. We perform a comprehensive and general survey of the object before scanning, then scan each part of the body to determine the accuracy of the work of the 3D scanner if we want medium or high, Etc. We also define the scan density and speed, and then define the area to be scanned from the body and click on the target to create a window around the target and then click acquire.

Fourth: We save the project in a special file and then upload it to the computer in the laboratory.

Fifth: In the laboratory, the modeling process begins, which is not easy, but we summarize here the most frequently used points, which are common cases encountered by all workers in this area.

The Other face of BIM

I feel chills when I recall the movie (Total Recall) of Arnold Schwarzenegger when the air was blocked from the people of Mars station, or when I remember the movie (Die Hard) of Bruce Willis when group of thieves tried to terrorize the people of the capital and threaten the government through disrupting engineering systems for the vital services that population depends on .

And it comes to my mind an important question, will we be the first workers in the field of BIM in our region who would cause such situations in the future for our next generations if we neglected the interest in the users' rights of this technology in various stages, whether in the design and construction or in operation?

Is it necessary to integrate protection systems from such events when designing and developing such technology, and here I mean protecting the right to life for BIM users.

That was a first point, and the second point is another question. How do we make a balance between the right of the owner and the right of the user?

For example:

A tenant of an apartment or a house does not pay the rent for any reason, from my point of view the owner has the right to cut off the services of him but with the preservation of his right to life. It's not possible, for instance, to cut off the drinking water that preserves his life and keeps his ability to contact the help and emergency, but what is increased for entertainment can be stopped to save the right of the owner or investor. This is no more than an example of the difference between preserving the right of an investor or the owner and preserving the life of the user.

The whole world needs an engineering protocol that protects human's life from the ascendancy of various regimes or the impact of wars on civilian lives even if humanity needs engineering proceedings above the power of regimes and countries.

Civil telephone communications cannot be interrupted in case of wars or revolutions, pollution of drinking water; or preventing the medicines and medical aids.

Therefore, I find that it's the duty of the workers on developing different technologies in the various stages (design, operation, etc.) to preserve the life's right of the users of this technology through preserving the engineering elements of life, which is a basic procedure that must be worked on and developed.

If this is not achieved, then we will see the black face of BIM in the future. For example, we will see a criminal ruler or an enemy for a population who has cut off the engineering elements of life from his opponents (drinking water, sewage, communications, etc.) for his own interests or the interests of his regime.



Mohammed A. Alkareem



Dunya A. Aldhaher



A Look at the Most Important Codes of the British BIM

By : Omar Selim



Translated by:Mahemmed Said

What is the difference between a program user like Revit or the Archicad and a specialist in BIM; what makes BIM Failed in some companies???

The answer to the two questions is the code.

The BIM SPECIALIST must be aware of the concept of the BIM acquainted and not just a user of the program.

Among the reasons for failure of companies that failed is the lack of a road and what the guidance code.

What is BIM?

Simply make a copy of the building on the computer with the information's we need

What is the use of codes or standards?

Unification and organization of work, consolidation of work so that not everyone has a special way of naming files and making an effort to know the content of the file and to open the file to know its content and lose a time that is estimated to be five project time a large probability of repeating files or having files that are not important

In August 2004, the American National Institute of Standards and Technology (IST) published a report in which conservative estimates indicate that 15\$ billion is lost annually in the United States construction industry due to a lack of regulations and standards.

The code organizes the work from the beginning and who will complete and how we exchange the information and who is entitled to open the file and modify it.

That's why we had to figure out the codes, translate them, and find a code for the Arab region.

We have to differentiate between the Standard that has the principles and the foundations to be found in a domain without entering into a competitive sphere.

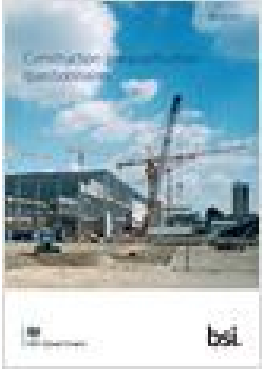


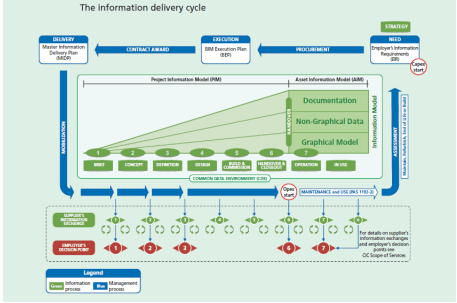
And the Protocol which is a kind of the Standard or more than a security detail the explanation is a step-by-step to accomplish a job, which may be related to applications or programs

Framework has a different goal that is will be like a procedure of communications between project groups or the ways that are connected in a way to solve a whole problem or their problems and do the same solution each time.

Are there too many codes for BIM?

Yes, almost 70 codes, including Norwegian, British, American and the Indians. So far, none of the Arabic codes (in Dubai, which was a race in its application) have yet to be coded and what we seek to achieve in initiative launched by BIM Arabia in the 6th edition and responded to by many thanks for reading and translating and working on an Arabic code for building information modeling.

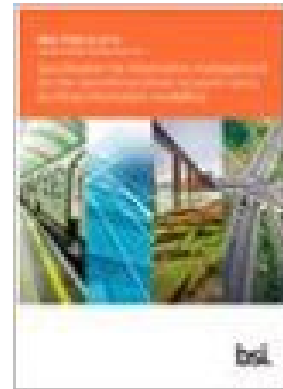
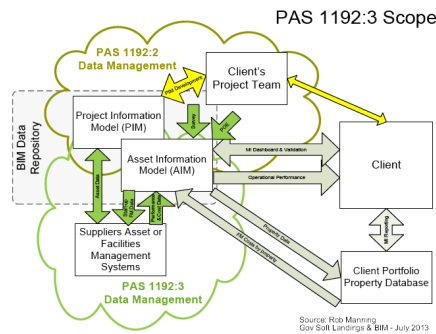
Now let's review the most important British standards:

Document	Scope	Image / Link
<p>BSI PAS 91</p> <p>PAS 91:2013</p>	<p>Specifications are available to the public</p> <p>Publicly available specification (PAS)</p> <p>Specifies the content and form of questionnaires at the tender stage</p>	
<p>BS 1192:2007</p> <p>Protocol for cooperation between designers and contractors</p>	<p>Criteria for the management of BIM & CAD using concurrent operations</p> <p>Mandatory for naming files, items, and ratings, it was designed for CAD</p>	
<p>PAS 1192-2:2013</p> <p>Specifications for the management of the project for the handover phase using the modeling of BIM</p>	<p>Specifies the requirements for building Information Modeling (BIM) Level 2-</p> <p>With many graphical and explanatory data to explain project information model (PIM)</p> <p>Important because it is mandatory for the Model to be adopted in particular</p>	 

PAS 1192-3:2014

Information management specification for the operational phase use of the modelling

Information management requirements for building Information Modeling (BIM) level 2 are defined in connection with the operation and maintenance of savings (buildings and infrastructure).



This is not PAS but British Standards COBie

BS 1192-4:2014

This British standard sets out a methodology for the transfer of the organization between parties related to facilities, including buildings and infrastructure. Forecasts for construction at the project stages shall be determined prior to the handover of subsequent projects in use.







Non-binding but indicative, mandatory part is COBie



PAS 1192-5:2015

Specifies the requirements for security management of the projects that take advantage of digital technologies and their scalable systems to build management systems, digital systems, adapters and intelligent asset Management.



<p>BS 7000-4:2013</p> <p>tnemeganam ngiseD tnahcreM .smeštyS ni tnmeganaM ngiseD gnitcartnoc</p>	<p>This part of BS 7000 gives instructions to manage the process of building design at all levels, for all organizations and for all types of construction projects.</p>							
<p>BS 8536-1:2015</p>	<p>This British Standard discusses project-related issues for the delivery of assets/facilities in accordance with specific operational requirement, including maintenance, and expected performance.</p>							
<p>BS 8541-1 TO 4:2012</p>	<p>Recommendations for determining the element library and its form to support the project, design, tenders, construction and management of built assets.</p>							
<h2>Other Documents</h2> <table> <tr> <th data-bbox="295 1294 427 1323">Document</th><th data-bbox="710 1294 794 1323">Scope</th><th data-bbox="1123 1294 1265 1323">Image/Link</th></tr> <tr> <td data-bbox="295 1547 416 1576">BIP 2207</td><td data-bbox="523 1330 981 2047"> <p>This book is a manual BS 1192:2007</p> <p>For the collaboration between the designer and the executor, the British Standard is a reference to practice which provides a better way to practice development, organization and management of the construction and construction information industry. It explains in detail the processes and procedures needed to improve the quality of production information. Designers will assist in the preparation of the information before it can be passed on to the team to enable the construction of the project.</p> </td><td data-bbox="1086 1503 1310 1809">  </td></tr> </table>			Document	Scope	Image/Link	BIP 2207	<p>This book is a manual BS 1192:2007</p> <p>For the collaboration between the designer and the executor, the British Standard is a reference to practice which provides a better way to practice development, organization and management of the construction and construction information industry. It explains in detail the processes and procedures needed to improve the quality of production information. Designers will assist in the preparation of the information before it can be passed on to the team to enable the construction of the project.</p>	
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BIP 2207	<p>This book is a manual BS 1192:2007</p> <p>For the collaboration between the designer and the executor, the British Standard is a reference to practice which provides a better way to practice development, organization and management of the construction and construction information industry. It explains in detail the processes and procedures needed to improve the quality of production information. Designers will assist in the preparation of the information before it can be passed on to the team to enable the construction of the project.</p>							

CIC BIM Protocol

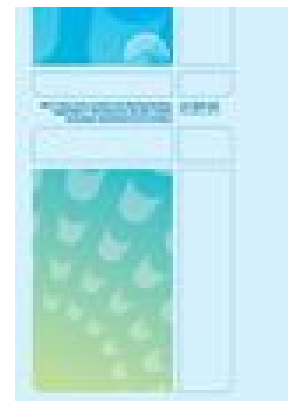
The BIM protocol is a supplementary legal agreement that is aborted in professional service and construction contracts. Simple modification. The protocol specifies additional obligations for the employer and the cohabitants. This protocol is based on a direct contractual relationship between the employer and the supplier. They do not have additional obligations or commitments between different suppliers.



We recommend it in contracts

CIC Best Practice

The best guide produced by Griffiths & armor in the name of CIC is to support the BIM Task group. The guide is directly geared to the cautious needs of the parties-especially the consultants in the production of information definition using the models of the building. The objective of this guide is to provide the most suitable practices to support the construction and construction industry to take it to level 2 of the building information modelling, which would lead to the major risks



CIC Outline Scope of Service for the Role of Information Management



CPIx Protocol



EIR Core Contents
and Guidance

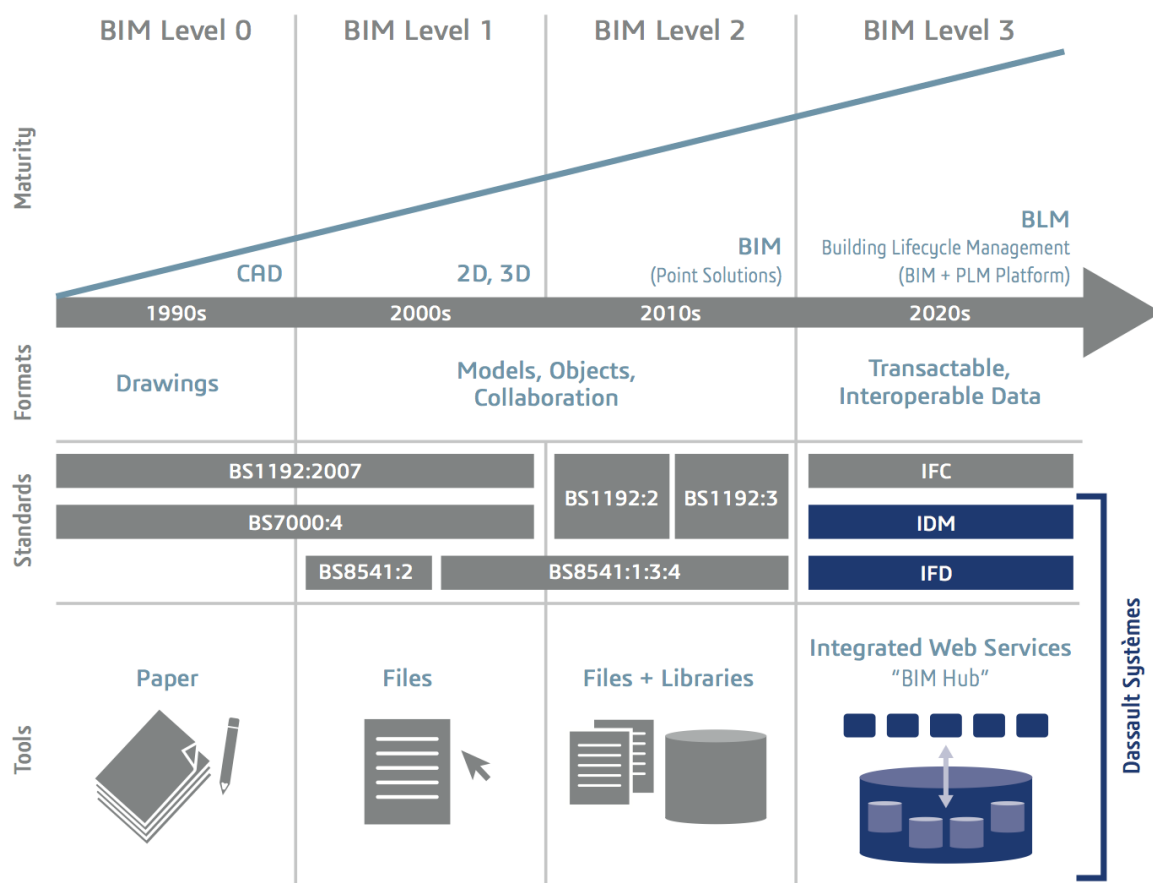
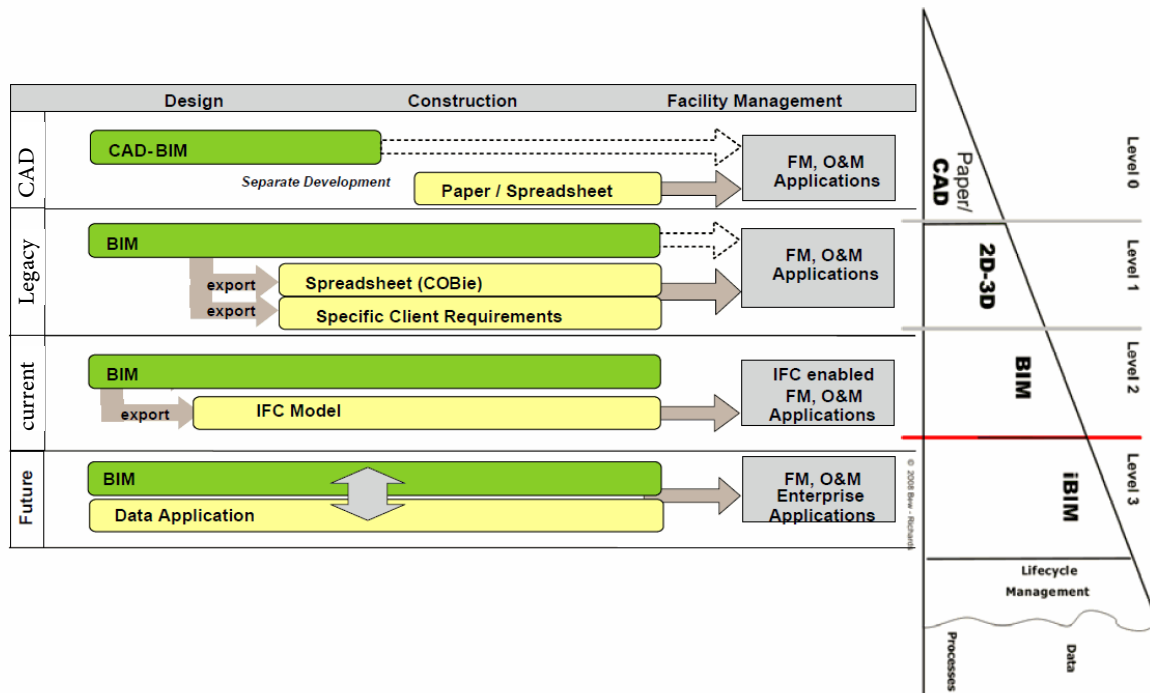


Almost all of these codes serve the second stage of the BIM.

There are three levels in the BIM application

- Zero level which is the level of the CAD and the level of non-cooperation just trace script and parentheses either on the sheet or on the computer, actually, the most closed here.
- The first level focuses on a three-dimensional model, reducing errors and continuing communication presumably if you're working with the British code. You are using BS 1192:2007
- The second level embodies the capabilities of the information model and the simulation and facilitation of the transmission and exchange of information and does not necessarily work on one model, which the most aspiring countries have in the IFC, COBie (Construction Operations Building information exchange)
- Level III < Open BIM is integration so that the work is on one platform and enable real-time handling everyone is working on the file, you do not have to import and export but to work on the file in all things like the work of the model and followed by time and then the cost and the dimensions

So far the third level depends on the extension of the Industry Foundation Class



The BIM Maturity Model by Mark Bew and Mervyn Richards adapted to reflect BLM's relationship to Level 3.



Important sites to follow the British codes

[/https://aecuk.wordpress.com](https://aecuk.wordpress.com)

[/http://www.bimtaskgroup.org](http://www.bimtaskgroup.org)

[/http://draftsman.wordpress.com](http://draftsman.wordpress.com)

Perhaps one of the most attractive things about the subject of BIM and in Revit program specifically is the Mass technique, this new technique has helped a lot of architects to create architectural and figurative forms of verse in dazzling and beauty thanks

The strength and wisdom of the tools used to form it. We all know the designs of the leading architectural engineer (Zaha Hadid) and her buildings

Formations that created architectural forms as long as they were influenced by the architects who came after them.

Why not? They have found a wonderful tool in their hands as a diamond tool in Revit, in contrast there are others who go to prefer a program (Grasshopper), which was designed by Rhino and has the same concept of mass technology

Building magnificent architectural blocks of great performance through what is known as the geometry of logarithms and mathematical functions and also enter Parametric design in this regard as well.

The entry of mass specifically in the program and the benefits of this program are known as useful features such as inventories and building blocks as they are in reality before being transformed into a physical reality is in itself considered an excellent thing why? Imagine with me that you are building a model similar to the Sheikh Zayed Bridge in Abu Dhabi, for example in Rivet program through mass technology

Imagine the amount of effort you will make when you calculate the amount of work and construction of the bridge through the program AutoCAD For example, it will certainly be a hard and expensive process at the same time and may also cost a lot of time. But using mass technology will be very easy not only at the design stage but at the whole project, this is the fundamental difference in the subject.

Some of the lovers of max may be annoyed by this talk and they will say Max also does this and more (but just let us meditate in word) but (there are advantages Revit provides like quantities we can't find in max

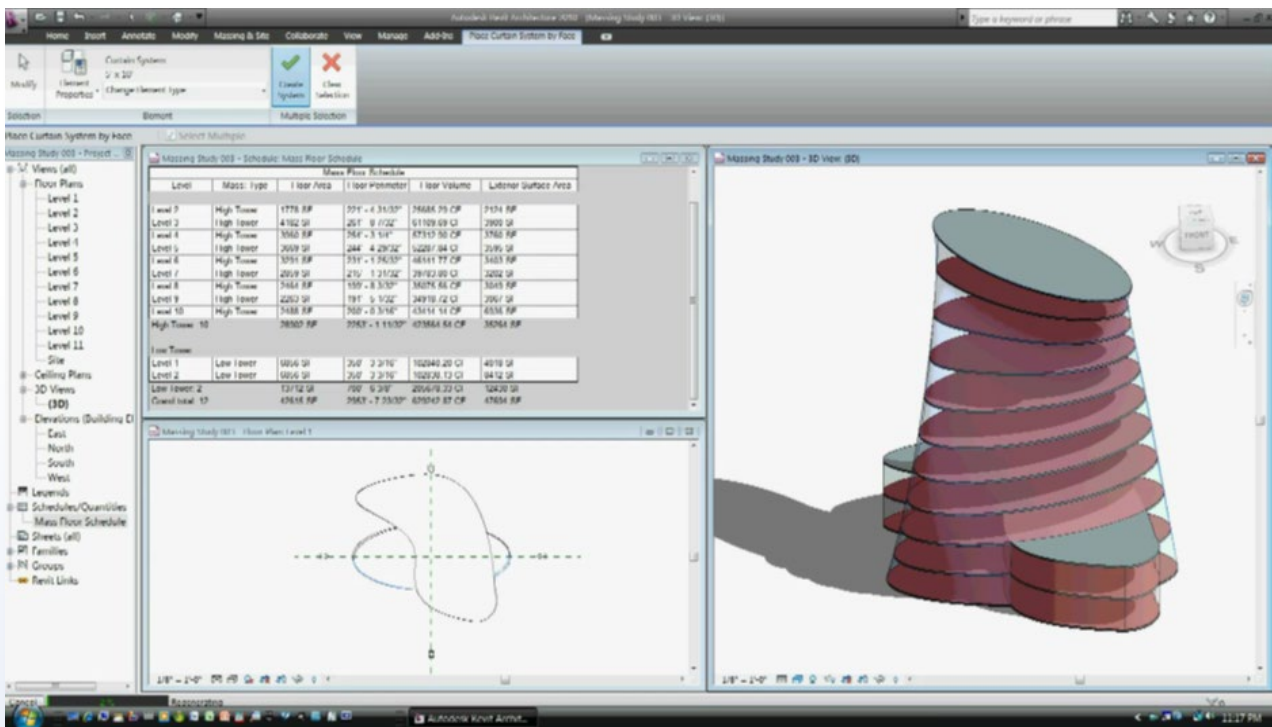
The Mass in Revit & its applications

 Eng. Amar Altom

 Najwa Salama

The mass in the Revit contains very powerful tools in the field of architectural design and for the work of all different forms such as ceilings, curtain walls, columns and other exotic designs

It is very easy in mass when we design a tower with a distinctive organic architectural structure, it is easy to add floors for this tower just a few clicks on the mouse according to the section plan as well as know the space and volume of materials and finishes used too, through mass we can do whatever we dreamed of architectural forms that were only suppressed in our imagination and we cannot take them down to the ground.



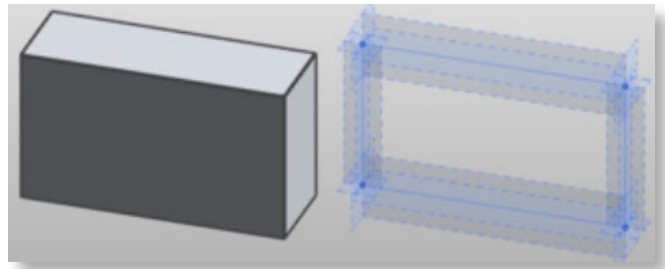
In the next part there are ten important things you should know about mass and those who mastered it. 10 points:

1 - The spacebar can be used to close the model and the selected surface (called Spacebar Toggle Coordinates).

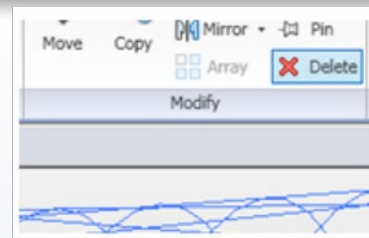


2 - Form is done from normal lines. If the form is deleted, the lines will also be deleted

But if the form is done from reference lines, and delete them, the form the reference lines made will remain and can be reshaped from them again.



3 - The background color from the Properties menu and the Graphic Display Options option the mass pattern can be closed or opened. You can also change the color of its gradients if desired.

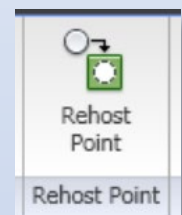


4 - Deleting split surfaces after the partitioning of mass can be done, delete them only later by selecting the partition is omitted and press the icon Delete

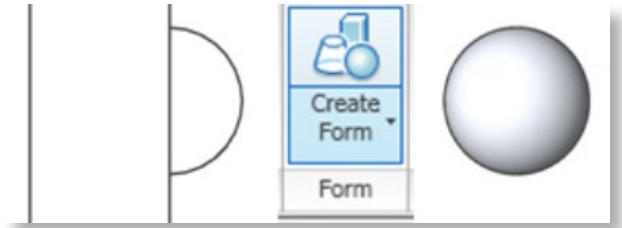
5 - a 3D Snapping can be activated through the options bar if Lines are selected And reference lines.



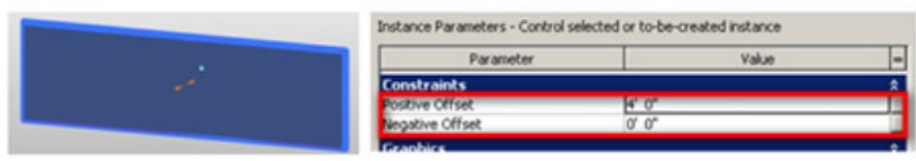
6 - When you select a reference point on a surface, the Rehost option appears in the Ribbon using it you can move the point and define it in another surface.



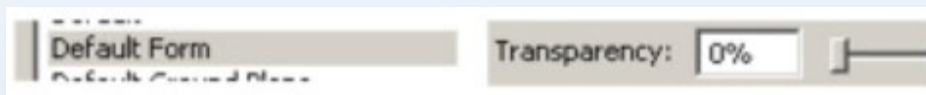
7 - To draw a ball by MASS, you can draw a vertical or horizontal line with a perpendicular arc, and then choose Create Form to form the shape. The angle of rotation can be adjusted from 0 to 360 degrees.



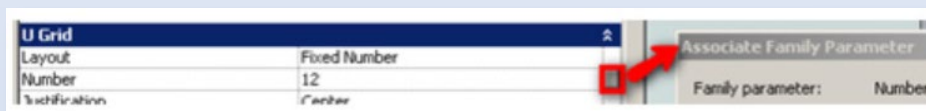
8 - A Reference Plane can be plotted using variable values, either positive or negative, just make any surface and any dimensions and go to the Properties window and edit what you want



9 - The transparency of the mass form element can be modified from Edit Materials and then Default Form Material and choose the desired transparency by dragging the slide mode Normal Transparency will be zero in the family environment and 70 in the project environment.



10 - In the mass environment when elements are divided, parameters could be set for the element if we are forming a set of different families, for example, different models of curtain walls for the same building only by changing the Family type The element changes only.

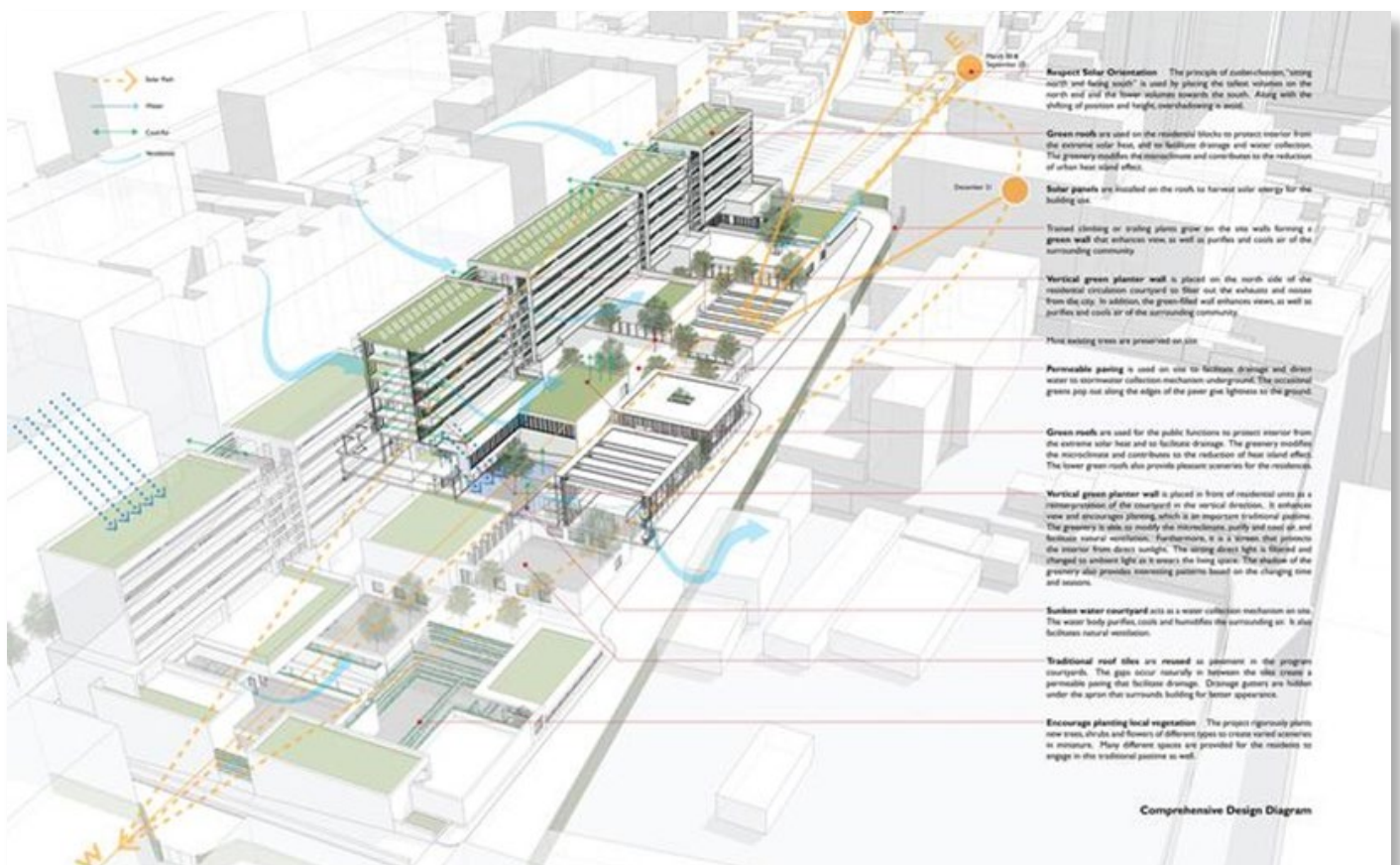


There are more ideas and solutions to this unique technique and there are hundreds of videos on YouTube to form formations and the roofs by mass for those who want to know the technique will help him a lot in his field and will contribute to increase his collection of ideas of different architectural design and renewable. Hope you have enjoyed with us this short journey in mass with the hope of meeting you in many other articles and I will leave you in the care of God and to meet soon.

The comprehensive design is an integration of design between the determinants and requirements of the building, the location, the city, the architectural and urban context, as well as social and climatic factors.

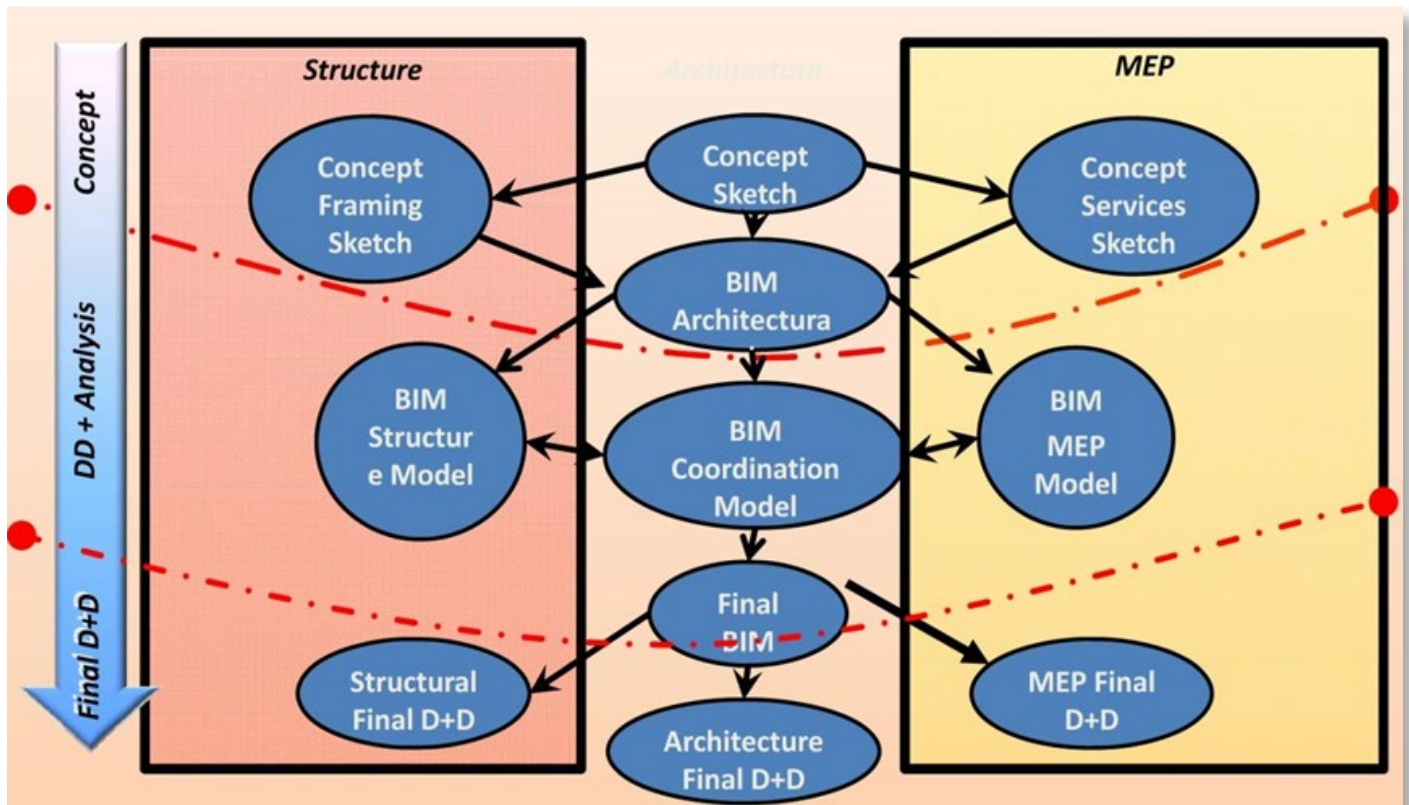
The comprehensive design is one of the most important architectural and urban design trends since the 1980s. From the end of the Second World War to the early 1980s, architectural design was largely separated from urban design, which was in turn separated from the environmental and social life of society and human. The example of this case was the spread of prefabricated concrete buildings in Europe, especially after the Second World War which deformed and had a bad effect on the European capitals, and then they were completely eliminated by the mid-eighties but unfortunately some of our Arab cities use this type of construction so far.

Building Information Modelling (BIM) and Comprehensive Design



The comprehensive design is to take into consideration all the design determinants of the building, location, environmental and climatic considerations, and to link all of them in one design system. Hence, the role of BIM which works as a design environment for all these determinants.

Building Information Modelling (BIM) is the best applied system to achieve the concept of comprehensive design; this system allows to collect all architectural, structural and MEP information using software programmes, such as, Revit. In addition, focus on urban information and infrastructure information using software programmes, such as, Civil 3D. Moreover, environmental information that can be analysed and utilised by software programmes, such as, Ecotect.



Written by:

Ayman Ahmed El Beda

Translated by:

Dunya A. Aldhafer

In this particular seventh issue of BIMArabia you find a diversity of topics.

We start a new series of learning the software Dynamo which is an amazing tool to simulate different designs without the need for learning a textual programming language.

We have discussed the other face of BIM that happens to show up if we abuse it, and recalled the Prison Break series when Michael, an Engineer, could break into the strongest prison because of the availability of CAD drawings with him. Imagine if a BIM model of a bank or ministry reached the wrong hands of a gang of terrorists.

Moreover, and as per requested by some readers, the conference of "BIM The Measure of Success" and a workshop at the University of Salford were covered, which are useful resources for learning about the latest science, exchanging point of views and bringing them closer.

We also discussed laser scanners, a technique that added a lot to BIM, where you can make a model for an existing building instead of remodeling it from scratch. Imagine if you would model a temple like "Abu Simbel" or Sphinx, how much time, effort, and tourism would be wasted to model such monuments to its finest details?

With scanners however, you can do this easily. This has been done for cities sunk in sea, of which you can print to your preferred material via a 3D printer.

Artificial Intelligence took a part of the discussion as well, which means the extent to which the program can deal with unplanned scenarios and its ability to learn new things and gain knowledge through experience.

As we quickly introduced to most important British codes for BIM which are crucial to know and arrange the work in the company

You will also find an explanation of massing in Revit and some tricks that facilitate the work.

And finally, an explanation of the overall federated design.

I hope this issue meets the acceptance of the Lord Almighty and you readers. Waiting for your favorable advices to further develop the magazine.

Team Work

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Eng. Sonia Ahmed
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Eng. Maisoon Alsorori

BIM arabia

7th issue

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